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ENERGY IN WISCONSIN

The global demand for energy has increased rapidly in recent years as new economies blossom throughout the world. This increased demand is just one of the political, environmental, and economic issues associated with energy generation and consumption. Wisconsin's current energy situation is poised to change significantly in the coming decades as the state moves from the traditional energy sources used today to alternative energy sources and new ways of utilizing existing resources for the future. This brief discusses some of the issues surrounding traditional and alternative energy, and summarizes some of the major energy-related bills introduced during the 2009-2010 legislative session.

WISCONSIN'S ENERGY

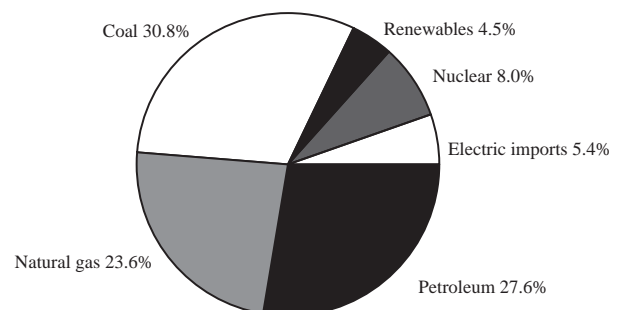
Energy Sources

Wisconsin currently derives its energy from petroleum, natural gas, coal, nuclear fission, and renewables such as wood, wind, and solar power. In 2008, the most recent year for which data is available, petroleum and coal were the most widely used sources of energy in the state; with coal contributing 31 percent to our total energy consumption, and petroleum 28 percent. Natural gas was the third leading energy source, representing about 24 percent of Wisconsin's consumption, while nuclear energy (8%) and renewables (4.5%) were used relatively sparingly. The remainder of our energy, around 5 percent, comes from imported electricity.

Wisconsin consumed almost 3 percent more energy per capita than the average state

in 2008. Wisconsin burns significantly more coal than other states, over 50% more in 2008. However, as a result, the state consumes less petroleum, natural gas, renewable, and nuclear energy. The state also imports electricity generated in other states or Canada and transmitted via high voltage transmission networks. In general, Wisconsin's energy is derived from the same sources as other states, so the energy issues in Wisconsin are the same energy issues facing the rest of the nation.

Energy Sources



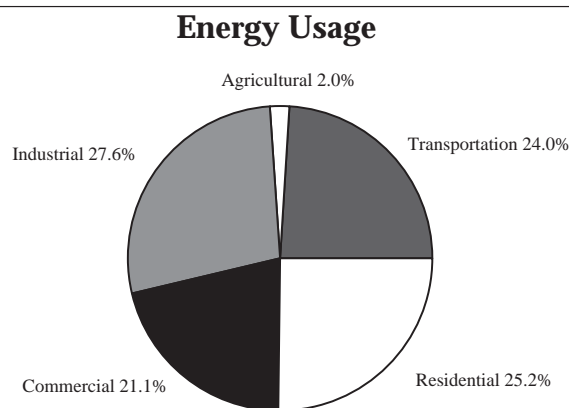
Source: "Wisconsin Energy Statistics 2009," Wisconsin Office of Energy Independence.

Energy Usage

Most of the energy consumed in Wisconsin is used to generate electricity or power transportation. Petroleum is primarily refined into products like gasoline and diesel fuel, which power motor vehicle engines for transportation and shipping. Coal, natural gas, and nuclear energy are mainly used to generate electricity, but natural gas also sees significant use in commercial and residential heating and cooking.

The Wisconsin Office of Energy Independence has broken down Wisconsin energy con-

sumption into five main sectors, which it ranks on annual consumption. In 2008, industry, which consists mostly of the manufacturing sector, consumed 27.5 percent of the energy used in Wisconsin. Residences were the second largest consumer, responsible for about 25 percent of our energy use. Transportation, whether commercial or private (24%), and commercial use (21%), round out the major energy consumption sectors in Wisconsin. Surprisingly for a traditionally agricultural state like Wisconsin, just under 2 percent of energy in 2008 was consumed by the agricultural sector.



Source: "Wisconsin Energy Statistics 2009," Wisconsin Office of Energy Independence.

Wisconsin's Energy Options

Wisconsin's energy needs are constantly evolving and the energy sources that meet those needs are evolving as well. Until relatively recently, Wisconsin was reliant almost entirely on traditional energy sources to meet its needs. However, new developments in technology and increasing concerns over traditional sources have led the state to review alternatives and consider its options for the future.

TRADITIONAL ENERGY SOURCES

Fossil Fuels. Wisconsin, like the rest of the country, has historically used fossil fuels as its

primary energy source. Fossil fuels like coal, petroleum, and natural gas are carbon-based substances formed by natural geological processes over millions of years. They contain a great amount of potential energy that can be released through simple combustion, and they can be found, in one form or another, all over the world. Because fossil fuels are so common and easy to use, they've become the dominant energy source for most of the world. However, concerns over their use have mounted in recent years.

The widespread, long-term use of fossil fuels creates a problem that cannot be ignored – dwindling supply. Because these fuels formed over millions of years, they cannot be quickly and easily replaced. The global supply of fossil fuels, though high, will not last forever. The cost of these fuels will invariably increase as the supply decreases, eventually reaching a point where they are no longer a cost-effective energy source. Further complicating the situation is the fact that the bulk of the remaining supply of certain fossil fuels can be found only in specific parts of the world, creating the potential for nations to manipulate the price by monopolizing and hoarding resources, or using fuel as a tool in diplomacy or war.

Another concern with fossil fuels is related to their actual consumption. Although these substances contain a great deal of potential energy, they must be burned to release that energy, and pollution is an unavoidable consequence of that combustion process. Air pollution can cause health and aesthetic problems on an individual and local level, but some believe that it can also cause wide-ranging ecological and climate problems that span the globe. As more people in developing economies begin consuming more fossil fuels for personal and commercial activities, these air pollution problems become more pronounced.

The supply of fossil fuels seems to be stable for the foreseeable future, and new

technologies continue to be developed to sustain their availability and minimize the pollution they create. But supply and pollution will always be issues that accompany fossil fuel consumption, so the search for alternative fuels continues.

Wood. In addition to reliance on fossil fuels, Wisconsin has also used a renewable energy source since territorial days – wood. Perhaps the oldest energy source, not just in Wisconsin, but on the planet, wood still enjoys widespread use today. In fact, wood is currently the main source of renewable energy consumed in Wisconsin, although it is losing ground to more modern alternatives such as solar and wind power, and is dwarfed by the use of traditional fossil fuels. The main problem with wood, and the reason it is used mostly as a niche energy source, is its efficiency. Wood, compared to an equal amount of a fossil fuel like coal, contains very little potential energy relative to its mass, creating problems related to storage and transportation. For this reason, wood has been relegated primarily to consumer use in stoves used to heat private residences. It is, however, occasionally used as a fuel in some industries, especially those already heavily reliant on wood, like paper production and furniture manufacturing.

ALTERNATIVE ENERGY SOURCES

Alternative energy is increasingly being discussed as the future of Wisconsin energy policy. The category includes energy sources such as solar, wind, hydroelectric, biofuel, and nuclear fission, each of which share characteristics that tie them together as a group and distinguish them as an alternative to more traditional fuels. The most important of these characteristics is renewability. Renewability means that, unlike fossil fuels, these energy sources can be consumed without eroding their long-term supply, whether because the energy source is essentially unlimited, as in the

case of the sun, or because it can be renewed, as in the case of the agricultural products used to create biofuels. Renewability ensures a continued supply of fuel, which helps stabilize energy prices. Many renewable energy sources also create far less pollution than traditional fuels, which makes them even more attractive in planning long-term energy strategies. However, many believe that renewable energy technology has not progressed to a point where it can replace our reliance on traditional resources, so a hybrid system of old and new technologies may be required for the foreseeable future.

Solar Power. Solar power is most commonly gathered by large photoelectric panels that absorb energy from sunlight so that it can then be converted into electricity. This process requires little additional input or oversight, and produces no pollution, so it is attractive from a financial and environmental perspective. But thousands of large, expensive solar panels must be employed to harvest enough energy to offset even a small amount of fossil fuel use, so the initial investment in solar technology is much higher than maintaining the energy status quo. Proponents of solar power argue that as solar technology develops the price is decreasing, while at the same time the price of fossil fuels continues to rise, so investing in solar power technology is the best long-term policy.

There is another issue with solar power that is unrelated to cost, though still related to the solar panels themselves. A solar power gathering facility requires a great deal of open space to house the large solar panels, and many criticize those panels as unattractive, making them unpleasant to live near. Finding a suitable location situated far enough from residential areas to please homeowners, but close enough to efficiently deliver power will require a delicate balance.

An additional issue with solar power is also tied to location, but on a geographic rather than a local level. Solar energy is widely available in the sunnier climes of the western and southern United States, but is not as obvious an energy option for states like Wisconsin, which receive far less direct sunlight, especially in the winter.

Wind Power. Wind power is derived mainly from large turbines that are pushed by air currents to generate electricity. These are essentially a recreation of the windmills that have appeared all over the world for generations, but on a much larger scale. Like solar power, this technology requires little additional energy or oversight after installation, and creates no pollution. Wind power shares some of the problems of solar power as well. Like solar panels, the wind turbines used to generate electricity are large and expensive, which makes the initial investment into a wind power generation facility somewhat daunting. Those who live near wind power facilities share the same concerns as those near solar panels because the turbines have been called unsightly and they may even create noticeable noise while operating depending on their design.

Wind turbines also have a unique problem related to their size and location. They have the potential to injure or kill migratory birds, many of which are protected species. In fact, some critics say that the mere presence of these large turbines can disrupt migration patterns and routes of both birds and animals. Finally, as is the case with solar power, the viability of wind energy can vary significantly from state to state, as those situated on the edge of the Great Plains receive far more wind than those in other areas of the country.

Hydroelectric and Geothermal Power. Like wind and solar power, hydroelectric and geothermal energy sources use naturally occurring phenomenon to generate energy. In

the case of hydroelectric power, that phenomenon is usually the current of rivers or the movement of the tides. Geothermal power also commonly relies on the use of water and derives its energy from the heat in the earth. Dams and old-fashioned water wheels are basic examples of using water as an energy source, and modern hydroelectric energy generation works on the same principle, using water to turn turbines and generate electricity.

Geothermal power is less common, but it's often used to heat the buildings of large institutions like universities. Water is pumped deep into the earth where the planet's natural heat warms it for a period of time, then it is drawn back up and circulated through the pipes of buildings with passive heating systems. Both of these processes are sustainable and produce little or no pollution, but they also share potential aesthetic problems with solar and wind power. Hydroelectric generation facilities in particular can be large, expensive, and disruptive to people and wildlife alike. Not every part of the country is well suited to harnessing power from the flow of water or the heat of the earth, depending on the region's relative wetness and geological conditions.

Biofuel Power. Another alternative energy source that has received increased attention in recent years is biofuel. Biofuel is a fuel similar in energy potential to petroleum products like gasoline or diesel fuel, but it is created by processing organic materials into an efficiently combustible substance. This organic material can consist of crops grown specifically to be converted into biofuel, by-products from agriculture and food manufacturing, or even refuse. Because these materials can be repeatedly grown from year to year, the supply of biofuel resources is completely renewable. But unlike solar, wind, water, and geothermal power, biofuels do create pollution because they must be burned to release their energy. Thus, they are far less environmen-

tally neutral than other renewable alternatives.

Another concern unique to biofuels involves their production. Unlike the wind, water, and sun, the energy source for biofuel is not naturally occurring, at least not in the amounts required to make it a viable energy resource. The agricultural products most commonly used to produce biofuels are often the result of large agricultural operations that rely on gasoline and diesel fuel for planting and harvesting. There is concern that more fossil fuels will be expended planting and harvesting agricultural materials than can ultimately be derived from their eventual use as biofuels. Biofuel proponents concede this possibility, but argue that the process will grow more efficient as the technology behind it improves.

Further complicating the case for biofuels are the processing facilities which convert organic materials into fuel and create not only noise, but also unpleasant odors in the process. Biofuel production also has the potential to impact the food supply if biofuel crops displace food crops on valuable agricultural land. Food commodities such as corn and wheat could see significant price increases if more attention, effort, and land is directed toward crops such as switchgrass, which is commonly used in biofuel production.

Nuclear Power. Nuclear power has again been the subject of debate after earlier falling out of favor over concerns about potential dangers. No longer seen as a panacea or as an uncontrollable hazard, the conversation now focuses on maintaining safety and maximizing output. New technology, including smaller, more mobile nuclear reactors, and new techniques for storing and treating waste have made nuclear power an increasingly attractive option. Many hope to see it employed in a more widespread fashion to meet energy needs.

Nuclear power has existed as an energy source for decades, but concerns over spent fuel and potential accidents have caused its popularity to fluctuate. There are currently three commercial nuclear reactors sited at two nuclear power plant locations in Wisconsin operating at nearly maximum capacity. Wisconsin ranked 22nd out of 50 states in both nuclear capacity and nuclear power generation in 2008 according to the U.S. Energy Information Administration. Illinois, by comparison, had six nuclear power plants, each with two reactors, and it ranked first in both categories. Many other states have only one nuclear power plant with a single reactor, though no states have no reactors.

The advantages of nuclear power are its massive energy output and quasi-renewability. Nuclear power is generated through a nuclear fission reaction which heats water into steam, and the steam then spins turbines to generate electricity. The mechanism is similar to the practice of burning coal or natural gas to generate electricity, but the amount of energy produced is far greater, and the amount of fuel required is far less. In addition to requiring relatively little nuclear material to generate power, nuclear fuel is attractive because it is widely available. Although not as common as some fossil fuels, fissionable material is naturally occurring and can be found all over the planet. While the supply of fossil fuels may be declining, fissionable nuclear material has only been utilized for a brief period of history, so the supply is much less depleted. Nuclear fuel is also unique because it can be at least partially fabricated by enriching certain other nuclear substances until they contain enough energy to act as a fuel in a nuclear power facility. This possibility has led some to suggest that nuclear power should be considered renewable, at least when compared to current primary energy sources.

As a unique energy source, nuclear power also carries many unique concerns. Fossil fuels create air pollution when they are burned, but that pollution is transient and dissipates into the atmosphere over time. Nuclear fuel, on the other hand, leaves extremely hazardous and tangible physical by-products that remain dangerous for a very long time and must be safely contained and stored rather than being allowed to dissipate in the environment. Another problem of nuclear power is the potential for accidents. Because of the potential energy contained in nuclear fuel, and because of its hazardous nature, the dangers of a nuclear power accident far outweigh those of an accident at a traditional energy generation facility. An additional concern with regard to nuclear power is the fear that unspent nuclear fuel and waste could be stolen and used to create weapons if not properly secured.

ENERGY LEGISLATION

There were dozens of energy-related bills introduced during the 2009-2010 legislative session, several of which were signed into law by the governor. Most of these proposals addressed energy policy and regulation in a general sense, but some focused on specific industries, products, or renewable resources. A summary of this legislation highlights the energy issues and policies that will shape Wisconsin's future.

Energy Policy and Regulation

2009 Senate Bill 273, which was signed into law as **2009 Wisconsin Act 406**, creates a new energy credit for electrical utilities that derive power from renewable solar, geothermal, or biomass energy. Electrical utilities are required by law to use renewable resources for a small portion of their electricity production, and can receive credits for amounts generated in excess of the required amount. That requirement, known as the renewable portfolio standards (RPS), still exists, but Act 406 creates an addi-

tional energy credit incentive for utilities to favor solar, geothermal, and biomass specifically, rather than renewables in general, when meeting their RPS requirement.

2009 Senate Bill 624, which was signed into law as **2009 Wisconsin Act 272**, regulates the role of local government in energy policy. The act expands the authority of political subdivisions to issue loans for energy efficient or renewable energy improvements on residential properties so that those loans could also be issued for commercial and industrial property improvements. The law will now also allow such loans to be issued for water efficiency improvements, whether on residential, commercial, or industrial property.

A number of other bills related to regulating energy in Wisconsin were introduced during the session but did not pass. The most significant and wide-ranging of these energy proposals was the Clean Energy Jobs Act. It was introduced as **2009 Assembly Bill 649**, and companion **2009 Senate Bill 450**. The bills would have made numerous changes to Wisconsin's energy policy, among them: setting goals related to conservation and the use of alternative energy sources across the state, regulating industries that generate or consume large amounts of power, and loosening limits on the construction of new nuclear power plants.

Other bills were directed at regulating government rather than industries and utilities. **2009 Assembly Bill 843**, and companion **2009 Senate Bill 616**, would have required all major state and local government construction projects to conform to certain LEED Green Rating System requirements. Those are standards promulgated by the U.S. Green Building Council, a nonprofit organization that certifies construction projects if they conserve energy and limit pollution. **Senate Bill 616** passed the legislature but was vetoed by the governor because it was too singular in its purpose and would "result in all current maintenance pro-

jects being delayed indefinitely,” according to the veto message.

Some bills addressed energy issues related to specific products, activities, or industries. **2009 Senate Bill 521** would have encouraged the use of extended-range electric vehicles by creating various tax exemptions. Those vehicles operate on electricity, so they create no pollution and consume no fossil fuels during operation, except those that were used to generate the electricity they run on. The proposed tax exemptions would have applied to sales and use taxes related to the purchase of these vehicles, and property taxes on all tangible property used exclusively to deliver electricity to recharge them.

2009 Assembly Bill 800 would have provided a sales and use tax exemption for any purchases by a snow skiing facility designed to increase the energy efficiency of the facility’s operation. The energy needs of the recreational skiing industry are a concern because skiing facilities consume huge amounts of energy with their chair lifts, snow-making machines, and heated lodge buildings.

Renewable and Alternative Energy

Many bills related to renewable and alternative energy sources, primarily wind, biomass, and nuclear energy were introduced in the 2009-2010 session as well, and the governor signed two of them. **2009 Senate Bill 185**, which was signed into law as **2009 Wisconsin Act 40**, requires the Public Service Commission (PSC) to promulgate rules to dictate how much regulation a local government can put on wind energy systems within their boundaries. State statutes prohibit local governments from restricting the construction or use of wind and solar energy systems, unless the restriction is related to health or safety concerns or would not significantly increase the cost or decrease the efficiency of the system. By requiring the PSC to create rules for local units of govern-

ment to follow when making decisions on wind energy systems, the regulation of such systems that are created after the new rules take effect will be standardized all over the state.

2009 Senate Bill 279, which was signed into law as **2009 Wisconsin Act 401**, uses various means to encourage the use of biofuels, including expansion of financial assistance programs to produce, harvest, store, and transport agricultural materials used to create biofuel; changes to the tax code; and requirements that vehicles in the state fleet reduce reliance on gasoline, among other things.

Many other renewable or alternative energy bills were introduced but failed to become law. **2009 Assembly Bill 270** would have expanded a program that awards utility aid payments to political subdivisions. Currently, cities, villages, towns, and counties that contain power generation facilities receive utility aid payments from the state, and those payments are split between municipalities and the counties in which they’re situated. Cities and villages presently receive a higher percentage of those aid payments than towns, with the remainder going to the county. Under the bill, a town’s percentage of aid payments would have increased if the power generation facility located within its borders was wind-based, thereby encouraging the creation of wind power plants in towns, which are often geographically larger and less populated than cities or villages.

2009 Assembly Bill 88, was one of many biofuel bills introduced during the session. It would have allowed electricity generating utilities to include energy derived from garbage-based biofuels when satisfying the RPS. Currently, the allowable renewable resources include biofuels, but only those derived from wood or plant materials, biological waste, crops specifically grown to be converted to biofuel, or landfill gases. The bill would have expanded that definition to include garbage-

based fuels which would increase the supply of available fuel sources while also decreasing reliance on landfills for garbage disposal.

2009 Assembly Bill 794 would have encouraged the use of biofuels by creating an individual income tax credit, or a corporate and franchise tax credit, for the purchase of a thermal biomass heating system, and another credit for the purchase of biofuel consumed by the system. Biomass heating systems come in a variety of forms and can be used in residential, commercial, and industrial buildings.

Nuclear energy was another popular topic of energy-related legislation in the 2009-2010 session. **2009 Assembly Bill 516**, and companion **2009 Senate Bill 340**, would have eliminated requirements that the PSC only approve of and certify nuclear power plant construction if there is a facility with sufficient capacity to store all spent fuel from all nuclear power plants in the state. The construction of the new plant must be advantageous to rate payers when compared to comparable alternative energy technologies. Under the proposals, the PSC would continue to certify construction of nuclear power plants when appropriate, but would not be bound to deny certification based on these two restrictions, increasing the possibility that new plants might be constructed.

2009 Assembly Bill 309 was also related to nuclear power, as it would have required

nuclear power generators to pay certain sums to municipalities and counties where they store spent nuclear fuel. Spent nuclear fuel, which makes up the majority of what is commonly referred to as nuclear waste, can be stored away from nuclear plants using a “dry cask” method. If properly contained, the nuclear materials will be safe, but their storage can require a significant financial commitment, which the bill sought to offset.

Despite the fact that many of these bills did not become law during the 2009-2010 legislative session, it is certain that energy-related issues will continue to be a legislative priority.

FOR MORE INFORMATION

Wisconsin Office of Energy Independence, Wisconsin Energy Statistics:
<http://energyindependence.wi.gov/category.asp?linkcatid=2847&linkid=1451&locid=160>

Governors Task Force on Energy Efficiency and Renewables, October 2004:
<http://energytaskforce.wi.gov/docview.asp?docid=76>

Focus on Energy:
<http://www.focusonenergy.com/>

Wisconsin Energy Conservation Corporation: <http://www.weccusa.org/>

Clean Energy Wisconsin:
<http://cleanenergy.wi.gov/>